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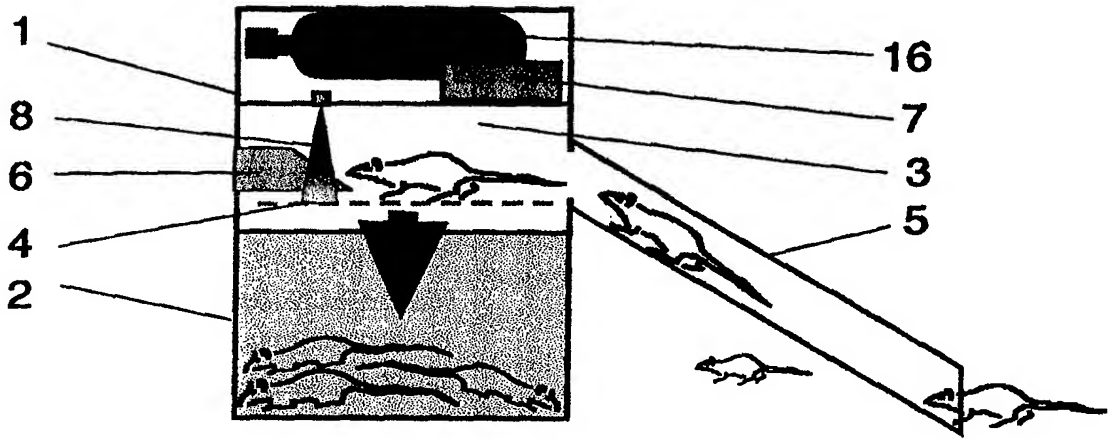

(57) Abstract

In a method of catching and optionally killing particularly rats, mice and similar animals, such as weasels, e.g. mink. in a trap of the type where the animals are caught in a separate chamber (13) and are optionally killed by a gas, preferably carbon dioxide, and where the animals are guided into the chamber via an entrance (4) connected with an activation mechanism (7, 8, 9) which may be released by an animal via a detection unit (8) when the animal is present on the entrance device; the animals are allowed to pass the detection device a certain number of times before the entrance device is activated. The animals are hereby allowed to gain a certain familiarity with the trap, which makes it considerably more effective. It is likewise disclosed that it is possible to use a device with the detection unit (8) in an entrance to watch whether vermin are present in a given area. This device may be constituted by a part of the trap.

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A METHOD AND DEVICE FOR TRAPPING RATS, MICE AND THE LIKE.

The present invention relates a method and a device for use in the extermination of particularly rats, mice and similar animals in a trap of the type wherein the animals are caught in a separate chamber and optionally killed by a gas, preferably carbon dioxide, and wherein the animals are guided into the chamber via an entrance device connected with an activation mechanism which may be released by an animal via a detection unit.

Extermination of rats typically takes place by putting down poison or by trapping, the putting down of poison being the most widely used method. The use of poisonous substances is problematic per se, and the direct drawbacks of the use are well-known per se. This may be injuries in humans, e.g. in that children unintentionally eat some of the poison, or in livestock and pets, e.g. pigs, cows, cats and dogs, in that these eat some of the poison deposits put down. When the rats have been exterminated, there will typically be residues of the poison deposits, which are gradually spread to the detriment of the environment. However, one of the greatest problems is considered to be a rapid development of resistency in rats to even the most recent types of poison. According to persons skilled in the field this may mean that putting down of poison will be ineffective within a few years. Seen from an animal ethical point of view, the use of the existing poisonous substances causing the animals to die from internal bleedings, is moreover unethical. Notwithstanding this, the use of poison for the extermination of rats is still the most widely used method.

As regards trapping with existing traps, this is considered to be relatively difficult even by persons skilled in the field, and is mostly used where it is either directly prohibited or where it is not desirable or possible to use poisonous substances for other reasons. This applies e.g. in food industries, in the health sector and generally within buildings. Practical experience with the common traps in the market, such as latch traps and net traps, shows very clearly that the traps directly or indirectly give the rats negative experience which they can communicate to their fellow creatures which then avoid the traps. Caught rats can thus leave odour traces which warn the other animals of danger and of keeping away. Practice shows that traps with the most lenient function are the most effective ones as the animals keep relatively calm.

The patent literature includes several examples of rat-traps. Thus, US-A 4 741 121 and US-A 4 566 218 disclose traps in which the rats are killed by carbon dioxide. The construction of these traps, however, is rather complex, but it is more essential that the traps may make the rats uncertain and scared as well as give them the opportunity to communicate this to fellow creatures inter alia by leaving odour traces.

The invention is based on the finding that traps having the most lenient function are the most effective ones. Accordingly, the object of the invention is to provide an extermination of the animals which is both effective and gentle.

In the method of the invention as defined in claim 1, the animals are allowed, in a trap of the type defined in the introductory portion of the claim, to pass the detection unit of the trap a certain number of times before the en-

trance device to the chamber is activated, whereby the animals gain a certain familiarity with the trap. Some of the individuals are thus given the opportunity to visit the trap a couple of times before they are caught. They are hereby allowed to return to the group and communicate the positive experience they have gained with the trap. The animals can be made additionally confident vis-à-vis the trap in that, in contrast to the use of bait, actual feeding of the animals takes place in connection with the entrance device. The experience of the animals is that they can freely come and go in the trap as they want, and that they are fed. That an animal disappears from to time to time is just regarded as a natural thing by fellow creatures.

In most situations, such as in case of rats and mice, killing of the caught animals takes place, which may be done with a gas, preferably carbon dioxide. In some situations, e.g. when catching weasels, such as mink, it may be desired to keep these alive, in particular if they are animals which have escaped from a fur farm.

A trap for use in the performance of the method is defined in claim 3, and is characterized in that the detection unit and/or the activation mechanism is released after a number of passages of the detection unit. It is noted in this connection that the detection unit may form part of the activation mechanism.

By selection of material, construction, design and feed the trap may be made inviting and tempting for the animals. The possibilities of the vermins getting negative experiences in and by the trap are eliminated, e.g. by avoiding repulsive shapes, surfaces, sounds, smells, etc., and by making the trapping and killing functions lenient, gentle, quick and comparatively noiseless, so

that no pain or fear are caused at all in the animals when they are caught and killed, or generally when they are present in and around the trap.

Additionally, the trap may be constructed so that this and thereby the vermins may be left undisturbed for extended periods of time. This is made possible by automatic recharging of gas as well as capacity for collecting a large number of killed individuals. This also reduces the need for frequent inspection and emptying of the trap.

The trap may be provided with an adjustable limiter device which is to ensure that the maximum number of vermins that can be caught between two emptyings is the number which the trap can hold. The maximum limiter may be based on electronic or mechanical counting and is to eliminate the possibility of overfilling with the consequent risk that the trap is totally or partially open and thereby allows the animals to communicate negatively with the fellow creatures.

In addition to familiarity with the trap, quick and lenient treatment of the animals during catching and killing is also extremely important.

When, according to the invention, the entrance device to the killing chamber is constructed as a self-closing drop door, a very gentle treatment of the vermins is obtained. A drop door moreover eliminates the risk of the animals communicating negatively with the surroundings. The drop door will disappear below the animal, without any possibility of the animal leaving warning odour tracks on the door.

The invention, in a simple form, may be embodied in the form of a closed box with the drop door mounted on the top.

A special embodiment of the drop door has a curved cross-section and is suspended rotatably about a longitudinal axis so that the door rotates when an animal stands on it. The embodiment is particularly suitable for use in traps with a tunnel into which the animals can crawl. When the axis of rotation of the door is offset relatively to the centre of gravity of the door so that the door is rotated solely by the weight of the animal, a simple structure is obtained without mechanical aids for causing the rotation. When the door rotates, the animal, figuratively speaking, is almost "poured" down into the killing chamber.

When using selected gases, e.g. carbon dioxide, ethical killing of trapped animals may be obtained, said killing being initiated with a quick, painless anaesthetization which also precludes the risk that the animals will have time to communicate negatively with the surroundings e.g. before their production of anxiety smells begins. It is decisive here that the animals are anaesthetized quickly. This may be done by a structure of the trap where the animals are killed by a gas heavier than atmospheric air, preferably carbon dioxide, and where the killing chamber is filled, at least partially, with the gas in advance so that the concentration is sufficient for anaesthetization and killing of the animals. The animals will thus drop directly down into an atmosphere of poisonous gas, which contributes to quick killing, which in turn means that the animals will not have time to communicate negatively with their fellow creatures. The actual fall down through the drop door will not in itself cause the air to be knocked out of the animal, but will after all cause extra

deep breaths which promote quick anaesthetization. Additionally, with a curved shape of the drop door, the animals will tend to land on their back or side, which in turn has a positive influence on quick killing.

In principle, with a gas heavier than air, it is sufficient to fill the killing chamber at the installation, but after all some gas will eventually diffuse, which may be compensated in that the trap is constructed such that the killing chamber is automatically replenished with gas from a gas reservoir at regular intervals.

To facilitate emptying of the trap and to avoid contact with the animals, the killing chamber may be provided with a drawer into which the animals fall and are killed. Particularly hygienic, the drawer may be lined with a bag in which the animals are collected. Alternatively, the chamber may be constructed such that the bag may be suspended directly in it. The use of a gas-tight plastics bag additionally reduces the diffusion of the gas.

A structure of the trap is composed of two units, viz. a catching unit with drop door and containing the vital mechanical/electronic parts in general and intended for mounting on top of the killing chamber as the other unit. This facilitates the construction and operation of the trap. In another structure, at least the gas bottle is arranged in a separate compartment in connection with the killing chamber, preferably at the side of it, which provides good tilting stability as the gas bottle is relatively heavy in relation to the trap in general.

The functions of the trap may expediently be controlled by a microprocessor by means of which information on the number of animal visits may be collected and processed. Of course, it may be the same animals which pass the de-

tector unit several times. The use of a microprocessor also permits easy adjustment of the visiting frequency for releasing the trap, which may even be made self-adjusting in dependence on the frequency of the visits. If the visits are quite frequent, indicating that many animals are present, the visiting frequency may be increased, and conversely be reduced if the visiting frequency is small, indicating that there are only few animals. The control of the visiting frequency may also be designed purely mechanically of course, e.g. with a mechanical counter unit.

It will be appreciated that the trap may be provided with a switch for the killing device, so that the trap may also be used for just catching living animals.

At certain locations, such as e.g. in the food industries, it is desired to watch a given area for the presence of vermins. On the other hand, it is not desired to set traps if there are no vermins in the area. This is solved according to the invention by arranging in the area a device with an entrance for the animals in connection with which a detection device is arranged for recording animals in the device. In the event that vermins in the area are recorded, traps may subsequently be set for catching these.

The device itself may substantially correspond to the trap without chamber, drop door and killing device. For example, the recording device may be constructed as a detachable part of the trap, which may then be used separately. In the event that vermins are observed, the device may be coupled to the rest of the trap which is then set.

An example of a rattrap according to the invention will be described more fully below in connection with the accompanying drawing, in which:

Fig. 1 schematically shows the rattrap seen in perspective from the entrance end,

fig. 2 schematically shows a cross-section in the rattrap,

fig. 3 schematically shows another embodiment of a rattrap,

fig. 4 shows an embodiment of a rattrap seen from the side,

fig. 5 shows a cross-section in the trap shown in fig. 4,

fig. 6 shows an embodiment of a release mechanism for the trap shown in figs. 4 and 5.

In principle, the rattrap may be divided into two parts, viz. a catching unit 1 and an underlying killing unit 2. The catching unit 1 is formed with a longitudinal tunnel-shaped compartment 3 defined by the walls of the catching unit and a drop door 4 of curved cross-section. Entrance into the tunnel 3 is obtained via an entrance pipe 5 detachably connected on the end of the catching unit 1. A feed dispenser 6 with bait for the rats is provided opposite the entrance opening of the tunnel. The length of the tunnel is adapted so that only one rat at a time can be present in it. It is likewise ensured that the rats do not nest in the entrance pipe in that this is provided with side openings. The floor is rough, while the passages in general have smooth and/or soft shapes and faces to facilitate the comings and goings of the rats.

The various functions of the trap are controlled by an electronic control unit 7 which is battery-powered. A photoelectric sensor unit recording the presence of a rat is positioned immediately in front of the feed dispenser in the ceiling of the tunnel. The sensor unit communicates with the control unit, which is moreover connected to an activator 8 in the form of a small air cylinder, alternatively an electromagnet which is activated by an electronically controlled air valve. This air valve operates a hold and release latch 9 for the drop door 4 which is rotatably suspended in the catching unit by a suspension at both ends. The activator is driven by compressed air from a carbon dioxide bottle, which is used for killing the rats, as will be explained later. The weight of the drop door and its offset suspension axis relative to the centre of gravity are partly adapted so that the drop door, solely by the weight of a rat, rotates instantaneously when the door is released so that the rat falls, or rather is "poured" down into the underlying killing unit 2, and partly so that the door, by its own weight, returns to the starting position likewise instantaneously. To dampen the impact of the drop door against the side wall in the trap in the extreme positions, shock absorbers, e.g. rubber mouldings, are provided on the points of impact.

The collection and killing unit 2 consists of a box 11 with an opening at the top defined by the drop door 4 and a box- or drawer-shaped insert 12 for the falling rats. The insert 12 may be pulled out from one end of the killing unit and may be lined with a plastics bag 13 for collecting the dead rats so that these may be collected and discharged in a packaged state. Thus, direct contact with the animals is avoided.

The insert is shown here as a pull-out drawer, but may also be constructed as a tilting drawer. Depending on the connection between the catching and killing units, the drawer may be totally superfluous. For example, if the catching unit is pivotally connected with the killing unit or may be lifted off, the actual killing unit may be provided with a collection bag or other form of disposable insert.

Carbon dioxide from a pressure bottle 16 with liquid carbon dioxide is used for killing the rats. To keep the vital parts of the trap assembled, the carbon dioxide bottle 16 is arranged in the catching unit, from which a pipe leads down into the killing unit via a reduction and control valve and terminates at a distance above the bottom in the insert 12. Since carbon dioxide is heavier than atmospheric air, it will settle on the bottom of the insert that is filled about 70%, which has been found sufficient by experience to anaesthetize a rat within quite few seconds and subsequently kill it. As the rat falls down, the carbon dioxide will be stirred up in the entire chamber below the drop door, which promotes quick anaesthetization of the rat.

Gradual diffusion of some of the carbon dioxide cannot be avoided completely, but the process is slowed down when the insert is formed with an air-tight plastics bag. The electronic control unit 7, which operates the control valve, may be set by a timer to replenish the insert at regular intervals. One replenishment per 24 hours has been found to be sufficient.

The rattrap shown in fig. 3 of the drawing is constructed in basically the same manner as the trap described previously, the difference being the structure of the drop door which is here constructed as two downwardly pivot-

able flaps 17, each hinged at the outer side. In general, the same reference numerals as above are used for the same parts. Alternatively, the door may be constructed as a sliding door which is pulled aside.

Figs. 4 and 5 of the drawing show an embodiment of the trap of the invention which differs from the two preceding ones in that a separate chamber 18 is provided at the side of the killing chamber 13, said separate chamber being capable of accommodating gas bottle, valve and electronics. The upper part 1 has a drop door 4, feed dispenser and sensor unit in the same manner as in the example shown in figs. 1 and 2. The upper part 1 is hinged 19 to the lower part 2 at the opposite end of the entrance, so that it can tilt forwardly, and a closing buckle 20 for locking to the lower part 2 is arranged at the other end. Bowl-shaped carrier handles 21 facilitating the handling of the trap are secured in recesses in the sides. The outer wall 22 of the "technical equipment room" 18 is hinged 23 at the underside about a longitudinal axis so that the wall may be pivoted down. In the closed position, the wall is kept in position in that the roof part has an upright flap which grips behind the outer wall 25 of the upper part 1. To allow opening, the upper part 1 must thus first be pivoted forwards to release the outer wall 22.

To stabilize the drop door 4, this is provided with end members having circular incisions adapted to the cross-section of the entrance 3.

To be completely certain that the drop door 4 opens, this may be equipped with an opening mechanism, as shown in fig. 6. The underside of the door mounts a block 27 capable of cooperating with a release pawl 28. The mutual engagement faces are toothed or are otherwise provided

with a frictional surface, so that the pawl holds the drop door in the starting position with certainty, as shown in the drawing. An air cylinder 29 connected with the gas bottle serves to release the pawl. Activation of the cylinder causes its piston 30 to affect the pawl on the underside of its protruding nose portion 31 so that the pawl pivots upwards. The end of the pawl is connected by a pull wire 21 with the underside of the drop door so that the drop door is activated positively for rotation when the pawl is released. A stop 33 is arranged to limit the movement of the pawl. The stop is arranged so that the pawl automatically falls back to the starting position, and relatively quickly, in which it engages the engagement face on the block. In this respect, the pivot point of the pawl is arranged above its centre of gravity, just as the point of attack of the pull wire is arranged on the other side of the pivot point of the drop door.

In principle, a device for watching whether rats or mice are present in a given area may be formed by the upper part 1 of the trap where the activation of the drop door is disconnected. Or a special device may be made for the purpose, i.e. with an entrance chamber, a feed device and an electronic unit, including sensor unit and indicator.

In the two first examples, the carbon dioxide bottle is placed in the catching unit, alternatively it may be placed in the killing unit as shown in the last example, where the lower position inter alia contributes to greater standing stability of the trap.

The invention thus provides an effective trap with an animal ethical killing form owing to its lenient treatment of the vermins.

Patent Claims:

1. A method in connection with the extermination of particularly rats, mice and similar animals by catching and optionally subsequent killing of these in a trap of the type wherein the animals are caught in a separate chamber (2, 13) and optionally killed by a gas, preferably carbon dioxide, and wherein the animals are guided into the chamber via an entrance device (4; 17) connected with an activation mechanism (7, 9, 10) which may be released by an animal via a detection unit (8) when the animal is present on the entrance device, c h a r a c t e r i z e d in that the animals are allowed to pass the detection unit (9) a certain number of times before the entrance device (4; 17) is activated.

2. A method in connection with the extermination of particularly rats, mice and similar animals in a given area, c h a r a c t e r i z e d by placing in the area a device having an entrance for the animals in connection with which a detection unit for recording animals in the device is arranged.

3. A method according to claim 1 or 2, c h a r a c t e r i z e d in that the animals are fed in the device, preferably at the entrance.

4. A device for use in connection with the extermination of particularly rats, mice and similar animals and of the type comprising a separate chamber (2, 13) in which the animals are caught and optionally killed by a gas, preferably carbon dioxide, and, in the entrance passages for the animals in the trap, an entrance device (4; 17) through which the animals may be guided into the chamber, an activation mechanism (7, 9, 10) for activating the entrance device, a detection unit (8) for recording animals

in the trap, said detection unit communicating with the activation mechanism to release the entrance device, c h a r a c t e r i z e d in that the detection unit and/or the activation mechanism (8-10) is arranged such that the entrance device (4; 17) is released after a number of animals have passed the detection device (8).

5. A device for use in connection with the extermination of particularly rats, mice and similar animals in a given area, c h a r a c t e r i z e d in that it has an entrance for the animals in connection with which a detection unit for recording animals in the device is arranged.

6. A device according to claim 4 or 5, c h a r a c t e r i z e d in that an animal feed site (6), where they can eat, is provided after the passage of the animals of the detection unit.

7. A device according to claims 4 and 6, c h a r a c t e r i z e d in that the feed site is arranged in association with the drop door (4; 17) so that, standing on the drop door, they can eat the feed.

8. A device according to claim 4 or 5, c h a r a c t e r i z e d in that the detection unit is a touchfree, passive detection unit (8), e.g. an optoelectric sensor.

9. A device according to claim 4, c h a r a c t e r i z e d in that the entrance device is constructed as a self-closing drop door (4; 17).

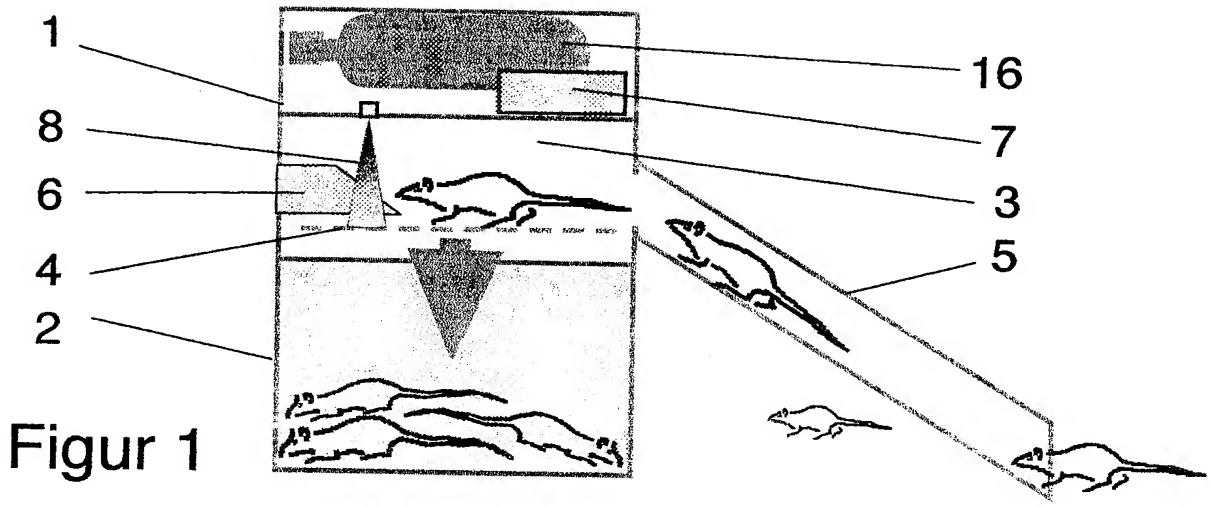
10. A device according to claim 9, c h a r a c t e r i z e d in that the drop door (4) is formed with a curved cross-section and is suspended (11) rotatably about a longitudinal axis so that the door, when acti-

vated, can rotate, preferably solely by the weight of an animal, in that the axis of rotation of the drop door is offset relatively to the centre of gravity of the door, so that an animal present on the door falls down into the chamber for storage and optional killing.

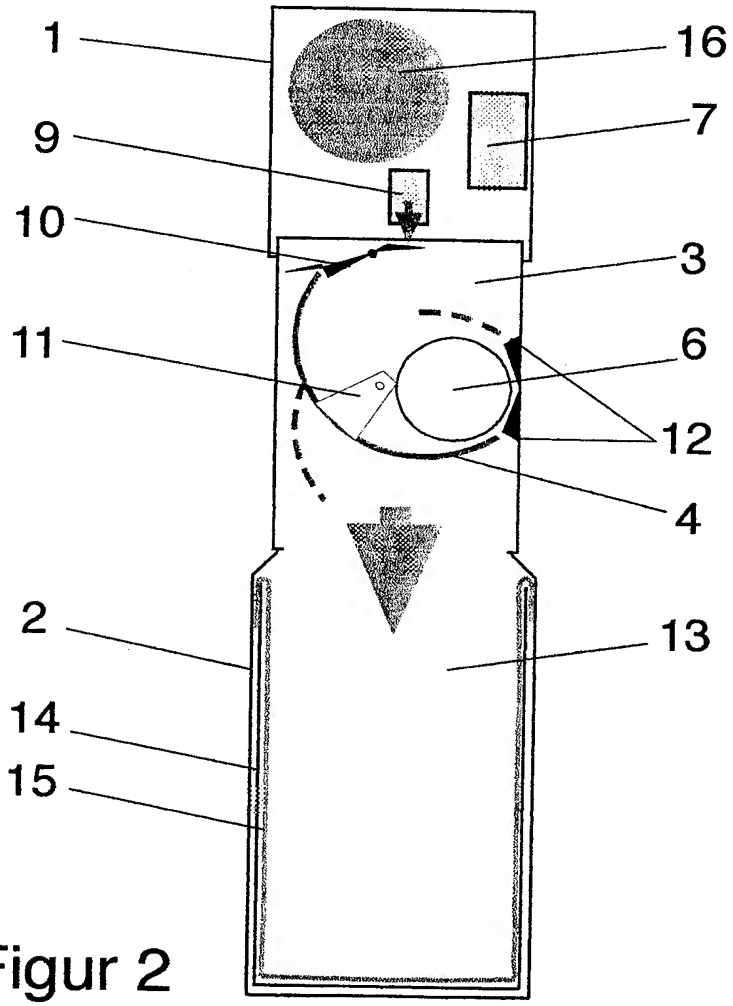
11. A device according to claim 4, wherein the animals are killed by a gas heavier than air, preferably carbon dioxide, c h a r a c t e r i z e d in that, in the use of the trap, the killing chamber (2, 13) is constantly, at least partly, filled with the gas in a sufficient concentration to kill the animals and also preferably arranged such that the killing chamber (2, 13) is replenished with gas at regular intervals.

12. A device according to claim 11, c h a r a c t e r i z e d in that the killing chamber (2) is lined with a preferably gas-tight plastics bag (13), said chamber being preferably provided with a drawer in which the bag is placed.

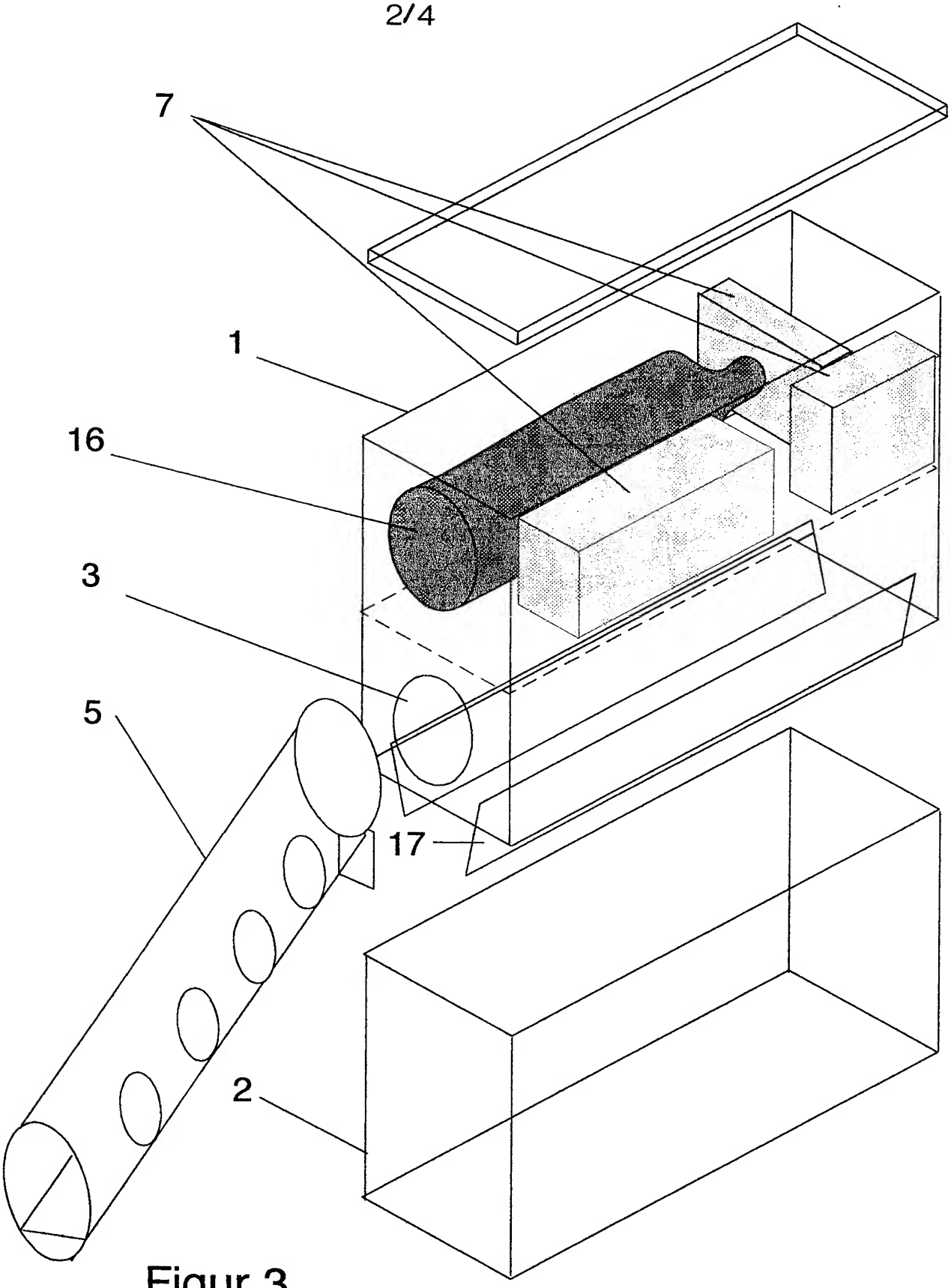
13. A device according to one of claims 4 to 12, c h a r a c t e r i z e d in that it is constructed as two interconnected main parts, viz. a catching unit (1) with a drop door (4; 17) and containing the vital mechanical/electronic parts in general and a unit consisting of the chamber (2) for storage and optional killing.



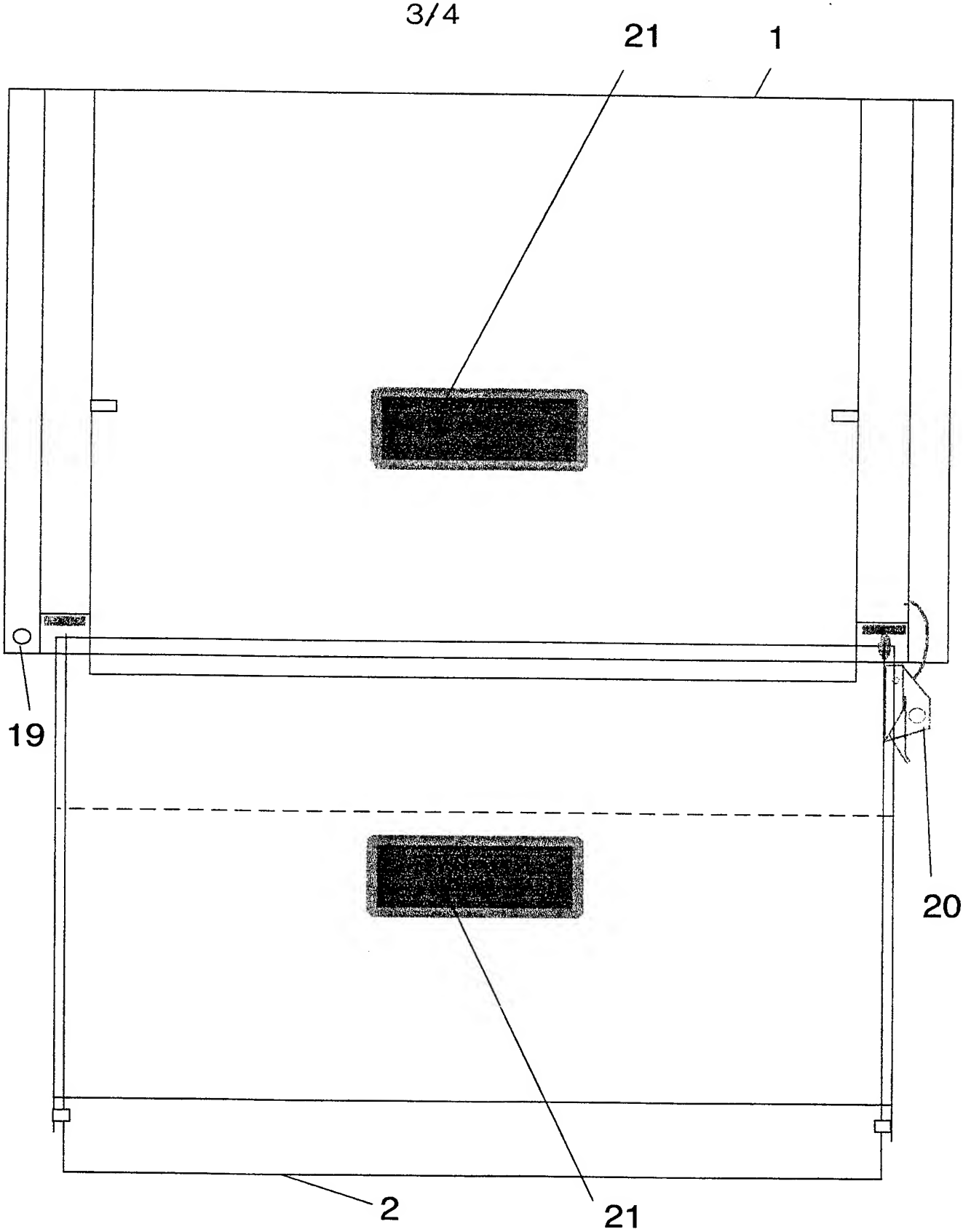
Figur 1



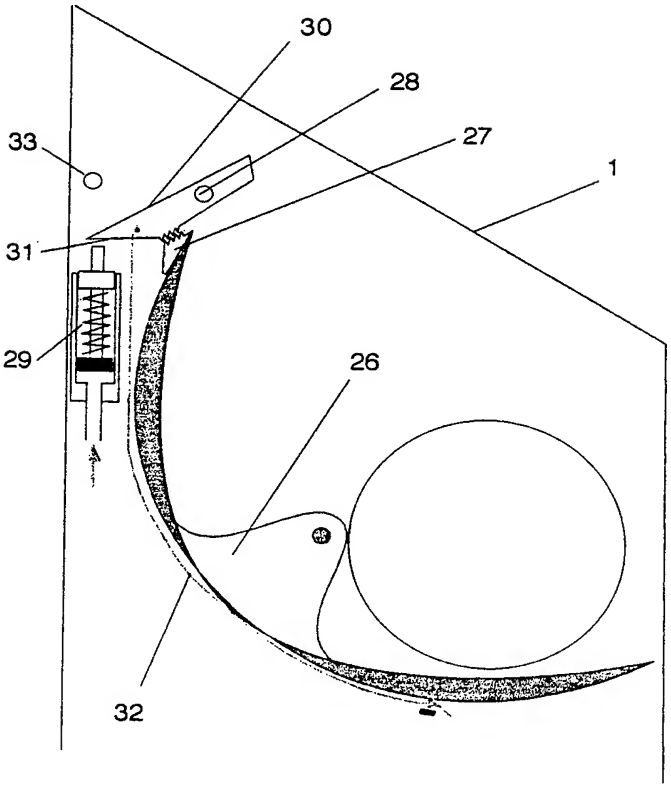
Figur 2



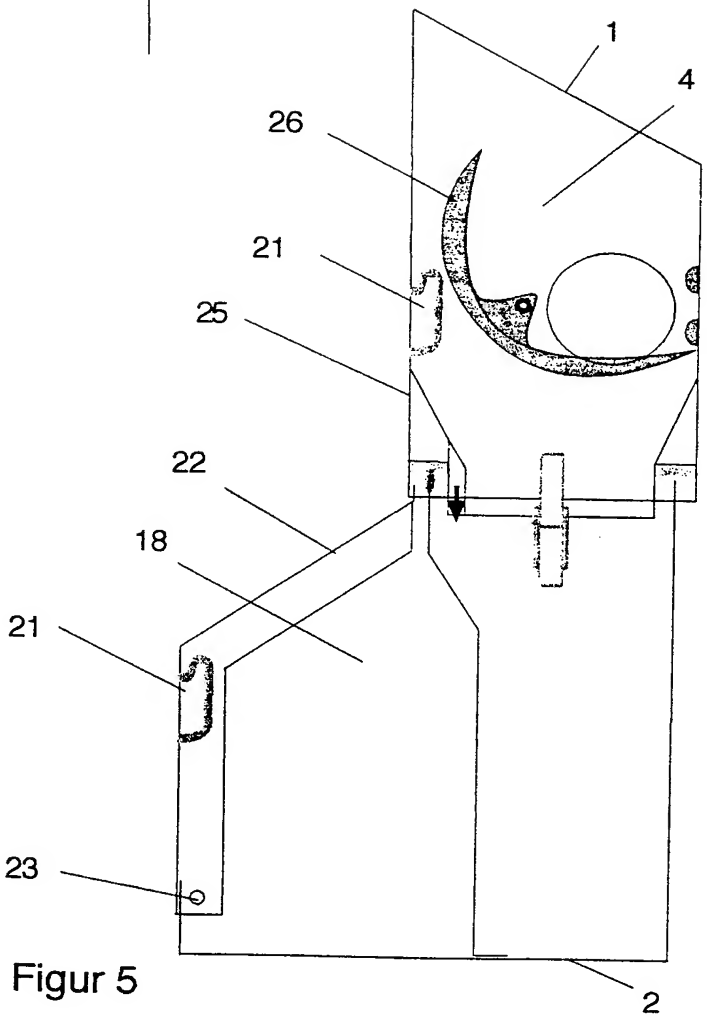
Figur 3



Figur 4



Figur 6



Figur 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 98/00168

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A01M 23/12, A01M 23/02, A01M 23/38
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EDOC, WPIL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search	Date of mailing of the international search report
25 June 1998	06 -07- 1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jörgen Winther Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

Information on patent family members

09/06/98

International application No.
PCT/DK 98/00168

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DOCUMENT-IDENTIFIER: WO 9848620 A1

TITLE: A METHOD AND DEVICE FOR TRAPPING RATS, MICE AND THE LIKE

PUBN-DATE: November 5, 1998

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INT-CL (IPC): A01M023/12 , A01M023/02 , A01M023/38

EUR-CL (EPC): A01M023/38 , A01M023/02 , A01M023/12

ABSTRACT:

CHG DATE=19990905 STATUS=C>In a method of

catching and optionally killing particularly rats, mice and similar animals, such as weasels, e.g. mink. in a trap of the type where the animals are caught in a separate chamber (13) and are optionally killed by a gas, preferably carbon dioxide, and where the animals are guided into the chamber via an entrance (4) connected with an activation mechanism (7, 8, 9) which may be released by an animal via a detection unit (8) when the animal is present on the entrance device; the animals are allowed to pass the detection device a certain number of times before the entrance device is activated. The animals are hereby allowed to gain a certain familiarity with the trap, which makes it considerably more effective. It is likewise disclosed that it is possible to use a device with the detection unit (8) in an entrance to watch whether vermin are present in a given area. This device may be constituted by a part of the trap.